PATENT
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	)	
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JOLINDE MACHTELD VAN DE GRAAF and THIJME LAST	)	
	)	
Serial No. 10/533,172	)	Group Art Unit: 1797
	)	
Filed April 29, 2005	)	Examiner: Frank M. Lawrence Jr.
	)	
REMOVAL OF SULPHUR COMPOUNDS FROM HYDROCARBON STREAMS USING ADSORBENTS AND REGENERATION OF THE LOADED ADSORBENTS	)	November 7, 2008

COMMISSIONER FOR PATENTS
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

RESPONSE TO NOTIFICATION OF NON-COMPLIANT APPEAL BRIEF

This paper is in response to the Notice of Non-Compliant Appeal Brief that was mailed on 30 October 2008. This mailing is after that of the Examiner's Answer on 14 October 2008.

The Notice states that the status of all the claims was not provided in the brief. The Notice also states that only the defective section of the brief, and not the entire brief, may be submitted.

The following is the submission of the defective section.

Status of claims

Claims 1, 5-8, 10-12, 14, 16, 18-21 and 23-25 have been rejected and are the subject of this appeal.

Claims 2-4, 9, 13, 15, 17 and 22 are canceled.

A copy of all of the claims on appeal can be found in the Claims Appendix.

Respectfully submitted,

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CLAIMS APPENDIX

1. A process, comprising: removing water from a hydrocarbon stream, comprising water and sulfur compounds selected from the group consisting of hydrogen sulfide, carbonyl sulfides, mercaptans, especially C_1-C_6 mercaptans, organic sulfides, especially di-C_1-C_4-alkyl sulphides, organic sulfides, especially di-C_1-C_4-alkyl disulfides, thiophene compounds, aromatic mercaptans, especially phenyl mercaptan, and mixtures thereof, wherein the total amount of said sulfur compounds contained in the hydrocarbon stream is up to 3 vol%, based on total hydrocarbon stream, by adsorbing water therefrom onto a first zeolite having a pore diameter of less than 5 Å; and thereafter, contacting said hydrocarbon stream with an adsorbent comprising a second zeolite having a pore diameter of at least 5 Å to adsorb the sulfur compounds thereon to thereby provide a loaded adsorbent, followed by a regeneration of said loaded adsorbent in the presence of water by contacting said loaded adsorbent with a regeneration gas stream having a relative humidity of at most 30% and comprising an inert gas or an inert gas mixture.

Claims 2-4 (Canceled).

5. A process according to claim 1, in which the hydrocarbon stream also comprises hydrogen sulfide and optionally carbon dioxide and up to 2 vol% hydrogen sulfide, with the hydrogen sulfide and part of the carbon dioxide being removed by means of washing the hydrocarbon stream with a chemical solvent.

6. A process according to claim 5, in which the temperature of the zeolite adsorption process is between 10 and 60 °C, the pressure is between 10 and 150 bara, and the superficial gas velocity is between 0.03 and 0.6 m/s.

7. A process for the regeneration of an adsorbent, wherein said process comprises: providing one or more vessels having a first adsorbent bed comprising a first zeolite having a pore diameter of 5 Å or less and a second adsorbent bed comprising a second zeolite having a pore diameter of more than 5 Å;

using said one or more vessels in the removal of sulfur from a hydrocarbon stream to provide said second zeolite that is loaded with sulfur; and
regenerating said second zeolite that is loaded with sulfur by contacting the adsorbent with a regeneration gas stream having a relative water humidity less than 100%.

8. A process according to claim 7, in which the adsorbent in said second adsorbent bed comprises zeolite dispersed in a binder.

Claim 9 (Canceled).

10. A process according to claim 7, in which the regeneration is carried out at a pressure between 1 and 150 bara, a temperature between 200 and 400 °C, and a superficial gas velocity of less than 0.20 m/s.

11. A process according to claim 10, in which the regeneration gas stream is a gas stream obtained by saturating the stream at a temperature below the regeneration temperature.

12. A process according claim 11, in which the regeneration gas stream has a relative humidity between 0.1 and 30%.

Claim 13 (Canceled).

14. A process for the removal of sulfur compounds from a hydrocarbon stream, wherein said hydrocarbon stream contains a sulfur compound selected from the group consisting of hydrogen sulfide, carbonyl sulfide, mercaptans, organic sulfides, organic disulfides, thiophene compounds, aromatic mercaptans and mixtures thereof, said process comprises:

treating said hydrocarbon stream to remove water therefrom followed by contacting said hydrocarbon stream with an adsorbent comprising a zeolite having a pore diameter of at least 5 Å to absorb said sulfur compound thereon to thereby provide a sulfur loaded adsorbent; and

contacting said sulfur loaded adsorbent with a regeneration gas stream having a relative humidity of at most 30%, wherein the regeneration gas comprises an inert gas.

Claim 15 (Canceled).

16. A process according to claim 14, wherein said mercaptans include C_1-C_6 mercaptans, said organic sulfides include di-C_1-C_4-alkyl sulfides, organic disulfides include di-C_1-C_4-alkyl disulfides, said aromatic mercaptans include phenyl mercaptan, and the total amount of said sulfur compounds contained in said hydrocarbon stream is up to 3 vol% based on total gas stream.

Claim 17 (Canceled).

18. A process according to claim 16, in which said hydrocarbon stream prior to contacting with said adsorbent, comprises hydrogen sulfide in the range up to 2 vol% hydrogen sulfide, and a part thereof is removed by means of washing with a chemical solvent.

19. A process according to claim 18, in which the temperature of the step of contacting said hydrocarbon stream with said adsorbent is between 10 and 60 °c, the pressure is between 10 and 150 bara, and the superficial gas velocity is between 0.03 and 0.6 m/s.

20. A process for the regeneration of an adsorbent, which is loaded with a sulfur compound, by contacting the adsorbent with a regeneration gas stream having a relative water humidity of at least 0.1% and less than 100%, wherein said adsorbent is contained in at least two beds, with one bed comprising a first zeolite having a pore diameter of up to 5 Å, and with a second bed comprising a second zeolite having a pore diameter of more than 5 Å.

21. A process according to claim 20, wherein said adsorbent of said second bed further comprises said second zeolite dispersed in a binder.

Claim 22 (Canceled).

23. A process according to claim 21, in which the contacting step is carried out at a pressure between 1 and 150 bara, a temperature between 200 and 400 °C and a superficial gas velocity of less than 0.20 m/s.

24. A process according to claim 23, in which said regeneration gas stream is a gas stream obtained by saturating the stream at a temperature below the regeneration temperature.

25. A process according to claim 24, in which said regeneration gas stream has a relative humidity between 0.1 and 30%.